

NOTES

PROFESSOR STOKES will be a member of the Royal Commission to inquire into the present State of Science in this country. Up to the present time then, so far as we are informed, the Commission stands as follows:—President, the Duke of Devonshire. Members: Professors Huxley, Stokes, and W. A. Miller; Dr. Sharpey, Sir John Lubbock, Bart., M.P.; Messrs. Lyon Playfair, M.P., and B. Samuelson, M.P.

THE following is the list of candidates recommended by the Council for election into the Royal Society:—W. Froude, C.E.; E. Headlam Greenhow, M.D.; J. Jago, M.D.; Nevil Story Maskelyne, M.A.; M. Tylden-Masters, M.D.; A. Newton, M.A.; A. Noble, Esq.; Capt. Sherard Osborn, R.N.; Rev. S. Parkinson, B.D.; Capt. R. Mann Parsons, R.E.; W. H. Ransom, M.D.; R. H. Scott, Esq.; G. F. Verdon, C.B.; A. Voelcker, Ph.D.; S. Wilks, M.D.

AT the meeting of the Royal Geographical Society on Monday Sir Roderick Murchison announced that the Earl of Clarendon had decided, on the part of Her Majesty's Government, to provide means for relieving Dr. Livingstone by land from Zanzibar, news from the doctor having been cut off some time since by the outbreak of cholera on the caravan route. Sir Roderick also announced that the annual general meeting would take place on the 23d inst., and that the Royal gold medals would be awarded to Mr. G. W. Hayward for his journey to Yarkand and Kashgar, and to Lieutenant Garnier, of the French navy, for his merits in bringing the great French expedition from Cambodia to Yangtsin after the death of its chief.

SCIENCE is lively at the Royal Society. Last week we had Principal Dawson's very interesting Bakerian lecture; this week we are to have the Croonian lecture by Dr. Augustus Waller, F.R.S., "On the Results of the Method (introduced by the lecturer) of investigating the Nervous System, more especially as applied to the elucidation of the functions of the Pneumogastric and Sympathetic Nerves in Man." The subject is one of which physiologists will recognise the importance.

THERE is a considerable number of papers on hand at the Royal Society, and there remain but two more evening meetings, May 19, and June 16. The question has been asked whether Dr. Bastian's paper on Spontaneous Generation is to be brought forward at one of those meetings. And the same question might be asked in the case of other papers, and it is not the only question by any means. Were not the present arrangements of the Royal Society (including the break from May 19 to June 16) made to meet a condition of things which has long passed away? And since the flow of papers into the Society has largely increased, why should not the outflow be a little accelerated, and why should not the Bakerian and other lectures be given on extra nights, so that common justice may be done to the authors of other papers? One would have thought that the Royal Society would have gladly hailed the many signs of increased scientific activity, and made arrangements accordingly.

MEDICAL Science has sustained a heavy loss in the death of Sir James Young Simpson, Bart., Professor of Midwifery at the University of Edinburgh, and discoverer of the anæsthetic properties of chloroform. He died on Friday last of disease of the heart, in the 59th year of his age.

M. VILLEMAIN, the Perpetual Secretary of the French Academy, died on Sunday morning last, at the age of 80.

THE practical importance to the State of the progress of scientific discovery was happily illustrated in the debate in the House of Commons on Friday evening last, on the question of opening the Public Galleries during certain hours of the evening. The Chancellor of the Exchequer threw out a suggestion that some mode of lighting might, before long, be discovered as effi-

cient as gas, and not liable to the objection of endangering the safety of the building. "Science," said he, "was advancing very rapidly, and difficulties which seemed insuperable in these matters to-day, might, if we waited patiently for a few years, be met and overcome." It is needless to point out to so acute a reasoner as Mr. Lowe, that in thus proposing to utilise the possible future discoveries of Science, he furnishes the strongest possible argument for that assistance to Science by the State which we so persistently urge.

In the same debate Mr. Lowe gave some hope that he might, in the course of the present session, state definitely the views of the Government with regard to the removal of the Natural History collections in the British Museum, a removal which he characterised as a "crying necessity." A considerable space of ground has been purchased by the Government behind the National Gallery, which will be used for some such public purpose.

THE Council of the Scientific Association of France at its last meeting appointed a mixed committee, representing the different branches of science, to perform the functions of the old commissions of astronomy, physics, and meteorology, entrusting to it at the same time the executive power, in the sense of regulating the public sittings, receiving requests for grants, &c. The committee, to which, at its own request, the Council has the power of adding the names of *savants* not belonging to its body, is composed as follows:—Astronomy, MM. Puisseux and Tissot; mechanics, MM. Eichens and Haton de la Goupillière; physics and chemistry, MM. Lissajous, Troost, and Cazin; meteorology, MM. Belgrand and Renou; geography, MM. Mouchez and Ploix; geology and palæontology, MM. Elie de Beaumont and Delafosse; botany, M. Lestiboudois; zoology and zootechny, MM. Milne-Edwards and André Sanson; agronomy, MM. Payen and Barral. The *locale* of the association is at present at M. Le Verrier's, 1, Rue des Saints-Pères, Paris.

THE discussion which followed Principal Dawson's lecture of which we give an abstract in another column,) was sustained by Sir C. Lyell, Sir R. Murchison, and Dr. Hooker. Sir R. Murchison objected to the adoption of the term "Erian" for the series of pre-carboniferous rocks of North America, corresponding to our Devonian or Old Red Sandstone, as an unnecessary innovation; while Dr. Hooker thought that caution was necessary before concluding that the apparently exogenous fragment of wood found in a bed occupying the centre of the "Erian" series must necessarily belong to a dicotyledonous tree. He considered it quite possible that the structure of the wood of some of the higher Cryptogams of this early period might closely resemble that of dicotyledonous Phænogams.

WE print the following note from St. John's College, Cambridge:—"The following have been placed in the first class of the college examination in Natural Science: Blunt, Garrod, and Read. The names are arranged in alphabetical order, and the examiners are the same as for the open exhibition adjudged on Friday last. The second-class contains four names, and the third three."

THE fiftieth anniversary of the Leeds Philosophical and Literary Society was commemorated during last week, in the usual English manner, by a dinner.

THE following Special Meetings of the Ethnological Society will be held during the month of June:—Wednesday, June 1st, at the Royal United Service Institution, Whitehall-yard; "Report on the Prehistoric Antiquities of Dartmoor," by Mr. C. Spence Bate, F.R.S. Tuesday, June 7th, at the Museum of Practical Geology, Jermyn-street; "On the Geographical Distribution of the chief Modifications of Mankind," by Prof. Huxley, President. Tuesday, June 21st, at the Royal United Service Institution, Whitehall-yard; "On the Aymara Indians

of Bolivia and Peru," by Mr. David Forbes, F.R.S. The meetings will commence punctually each evening at 8.30 P.M.

THE planet Lydia (No. 110), discovered by M. Borelly at the Marseilles Observatory on the 19th of April, had at $10^h 33^m 13^s$ mean Marseilles time, the following position:—Right ascension $12^h 23^m 39^s.22$; north declination $6^\circ 50' 38'' .8$. Its horary motion has been determined as follows:—In right ascension $-1^s.77$, in declination $+2'' .20$; its magnitude is between 12 and 13. M. Borelly had previously discovered two planets, bearing the numbers 91 and 99 in the system of asteroids revolving between Mars and Jupiter. These two planets had long been nameless, in consequence of the persistent refusal of M. Le Verrier to permit the astronomers under his jurisdiction to bestow any name upon them. The 91st has now received the name of Egina, the 99th that of Diké.

THE planet which bears the number 109 in the series of asteroids, and which was discovered at Clinton by Mr. C. H. F. Peters, on the 9th of October last, has received the name of Felicitas. The following are the new elements of its orbit, which have been calculated by Mr. William A. Rogers, from three positions, on the 9th of October, 28th of November, and 22nd of January last:—

Epoch: 1869; Oct. 9th, mean Washington time.

Mean anomaly	339° 5' 45" .21
Longitude of perihelion	55 56 3 .35
Longitude of ascending node	4 56 4 .35
Inclination	8 2 56 .10
Angle (sine = eccentricity)	17 27 2 .67
Logarithm of half of the greater axis	0.4304068
Mean diurnal motion	802" .41019

WE have received the first sheet of Messrs. W. and A. K. Johnston's new Illustrations for Botanical Lectures, selected and arranged by Professor Balfour. It is occupied with a general ideal drawing of the various organs of a plant; and with illustrations of the embryo plant, cells and vessels, root and stem. If the series fulfil the promise of the first sheet, it will supply a desideratum for the botanical lecturer. The sketches are clear and well executed, and if they are too crowded, it is difficult to see how this could be avoided without making the series of an unwieldy size. We would suggest that their utility would be increased if they are also issued in sheets and uncoloured. The setting on a roller is not always the most convenient, and many would be glad to save the expense of the colouring. The descriptive pamphlet of text accompanying the sheet, by Professor Balfour, is in itself almost an elementary handbook of botany.

IN the last report of the Registrar-General, he gives a valuable classification of the geographical distribution of various diseases in the different districts of England, and concludes by remarking: "It is true that the returns of deaths can never furnish such immediate notice of the origins of epidemic diseases as returns of cases of disease; but it is not true that the information of the death register is necessarily too late; it is too late as regards the individual, but it is not too late as regards the community, which can immediately adopt measures to quench the sparks before they involve it all in flames. The seas which divide this island from the rest of the world no longer ward off diseases, which are landed every day on her shores, and can no more be shut out than the east winds. The nation is associated with all races and nations by its maritime population, and with many by empire. And however much men may indulge the natural pride of nationality, in one respect their solidarity admits of no dispute; they are all subject to the same diseases, and are all interested equally in the mitigation of the sufferings and losses those diseases occasion. How can those evils be mitigated unless their origin is known, and unless science determine the laws by which they are governed? And recorded observation on a European scale is as necessary for the determination in this field of life as observation of the skies in astronomy,

without which Copernicus, Newton and Laplace could never have built up the system of the universe, or have given the navigator the means of avoiding shipwreck and finding his destination over the ocean. England is the only country in the world at the present time which publishes weekly and quarterly observations on an extensive scale in time to be available for immediate administrative use. But the Registrar-General hopes soon to get the co-operation of other countries, and in a few years to see in operation among several of the principal nations of the world one well-concerted series of reports of their marriages, births, deaths, and most controllable diseases."

IN the *séance* of the 11th April M. Duchemin brought before the Academy of Sciences of Paris the following curious fact in Natural History:—In the park of the Château de Montigny (Eure) belonging to M. Deroche, there is a large piece of water, through which a gentle current of beautifully clear water flows. In this lake numerous carp are reared, which thrive well, except during the first days of spring, when each year an extraordinary mortality occurs amongst them. In each animal one morbid symptom is always observable in the dead animals as they float on the surface of the water. In every case the animal is blind; a kind of film covers the eyes and even a part of the head. An examination of the body brings to light no internal disease, beyond a slight fatty degeneration of the tissues. The viscera appear healthy, and contain no intestinal worms. The cause of this strange malady has not hitherto received any notice; but from M. Duchemin's researches, in conjunction with M. Deroche, it seems that the toad (*Bufo calamita*) is an enemy, if not of all fishes, at least of the carp in spring. It attacks it, exhausts it, conquers, and kills it. To determine the point, they examined all the carp in the pond, and found squatting on the head of each of those that were diseased an enormous toad, the fore-paws of which were placed on the two eyes of the unfortunate fish. Thus, this ugly Batrachian, which presents so stupid an aspect, has yet sufficient intelligence to assume the offensive, and to overcome a large fish. If it has not agility and energy, it has cunning and perseverance. It would appear to kill by exhaustion, but it remains to be ascertained whether the acrid secretion of its skin assists in the conquest.

IN a still more recent *séance* of the Academy of Sciences, M. Duchemin, reverting to the above communication in regard to the mortality of the carp being in some instances due to the attacks of the toad, supplies observations which have been forwarded to him in support of his statements, and relates that from investigations undertaken at the Château de Montigny, the toad does not always remain permanently fixed on the head of the dead fish, but only so long as it gives signs of life. He observes, too, that all the carps from which the attacking toads had been removed were more or less blind. They were placed with care in another pond, but none of them recovered from the injuries received. No author has hitherto noted this animosity of the toad for the carp, who perhaps themselves consume the eggs of the toad. He has obtained additional evidence from M. Mermet, Directeur des Eaux at Contrexville (Vosges), who states that it has been found impossible to preserve carp in a sheet of water in that neighbourhood in consequence of the presence of numerous toads. M. l'Abbé Caillet, Curé of Rosoy (Haute Marne), whilst confirming the above statements, writes to him, "The toad is a villanous beast. One day I observed one that had crawled beneath a hive. There, with his two forepaws advanced and his throat wide open, he attracted the innocent bees, with which his sides were distended."

THE traffic of the Tower Subway—of the engineering features of which we recently gave an account (see NATURE, Vol. i., No. 11, p. 280)—has not been proceeding very smoothly, owing, we think, to defects in its management, and indeed was altogether suspended for a week or two. The passage through the tube is stated to be

often interrupted by the breakage of the wire rope; for this purpose two engines are used, one at each end of the tunnel, while the obvious and ordinary arrangement would be to employ only one engine driving a shaft with two drums and an endless rope. The arrangements might be very similar to those adopted in mines for raising and lowering the "cage," except that in this case the cage would be the carriage, and would travel on nearly a level line instead of up and down a shaft. The mode adopted for raising and lowering passengers in the shafts attached to the subway is by means of a chain which draws the carriage up and down, various "safety" arrangements being adopted in case of the giving way of the chain. For raising and lowering passengers, a chain or rope is not however the best means. In the apparatus in use in all the best hotels in America, there are no chains or ropes, no catches, springs, or buffers in case of accident. There is a vertical hollow cast-iron column reaching through the whole length of the shaft; in that shaft is the thread or helix of a screw projecting a couple of inches from its surface; the cage forms part of the nut, which rests in the screw or shaft. The shaft is turned by a small engine, controlled by the guard, who travels with the cage; he can moderate, stop, or reverse the motion, and accidents in the ordinary sense are out of the question. It will thus be seen that the problems to be solved as to the best means of transporting passengers through the Tower Subway are of the simplest kind.

We understand that the late Mrs. Appold has left to the Institution of Civil Engineers, a legacy of 1,000*l.*, payable at the same time as the legacy for a similar amount from her husband, the late Mr J. G. Appold, F.R.S., Assoc. Inst. C.E. It is believed that both bequests have been made "for the general use and benefit of the Society," without being fettered with any conditions.

To those of our Scientific Societies who annually assure themselves, and others, of their continued existence by a dinner, we commend the "Report of the Speeches at the Annual Dinner of the Institution of Civil Engineers, May 4, 1870," which we have just received,—as an indication of what a little energy can make even of a dinner. Professor Tyndall answered for Science, showing in a clear way how physical research lies at the root of all conquests of Nature, gaining help in turn from the practical man. "Thus does the human intelligence oscillate between sound theory and sound practice, gaining by every contact with each an accession of strength. These two things are the soul and body of science, as far as you and I are connected with it. Sever sound theory from sound practice, and both die of atrophy. The one becomes a ghost, and the other becomes a corpse."

We have received the first and second volumes of Dr. L. Lindenschmit's "Die Alterthümer unserer heidnischen Vorzeit," from originals in public and private collections, published under the authority of the Roman-German Central-museum at Mayence. The illustrations are most copious, and the work admirably done.

DR. R. CASPARY reprints from the Transactions of the Natural History Society of Halle a paper on the genus *Nuphar*. In examining the water-lilies of the Black Forest, as well as of Prussia and other districts of Northern Europe, he finds an intermediate form between *Nuphar luteum* and *N. pumilum*, which he regards as a true natural hybrid between two distinct species, and not as a mere transitional form. Another reprint from the Transactions of the same society is an essay on the Lennoaceæ, by H. Graf zu Solms-Laubach.

KONER'S *Zeitschrift der Gesellschaft für Erdkunde zu Berlin* contains a number of most valuable geographical papers, accompanied with carefully-executed maps; and a list of all geographical works, maps, and plans in all languages published between December 1868 and November 1869.

THE PHYSICAL CONSTITUTION OF THE SUN

DR. GOULD has addressed an important letter on the above subject to the Journal of the Frankland Institute. In the first part he refers to the new light recently thrown on the sun's physical constitution by the observations of Mr. Lockyer, and agrees with him and Dr. Frankland, both as to the absorption taking place in the chromosphere and photosphere itself, and also as to the possible telluric origin of the corona.

He then proceeds with regard to the probable age of the sun:—

"The researches of Helmholtz and Thomson regarding the age of the sun as a source of cosmical heat have shown us limits within which, in the absence of more decisive evidence, we must restrict our theories as to the length of time during which he has warmed the earth. The contraction-theory has been most ably discussed by these eminent physicists, and seems to afford the only satisfactory mode of accounting for the solar light and heat, now that we know both that the meteors generally revolve in cometary orbits, and that the habitability of the earth, as well as the apparent unchanged mutual attraction of the planets, bears testimony to the incorrectness of the meteoric theory. From Pouillet's data (derived from experiments which ought to be repeated in some year when the solar spots are at a minimum) Helmholtz has shown that, even were the sun's density uniform, a contraction of $\frac{1}{4}$ per cent. in his diameter would evolve 20,000 times the present annual supply of solar heat. But when the sun was hotter the same proportional contraction would have evolved yet more heat; so that we must consider the above estimate as a minimum.

"The expansibility of hydrogen gas for 100° C. is 0.3661. No gas appears to have so small a coefficient as 0.360, which would correspond to a linear expansion of 0.108. The expansibility of glass, the smallest known, I believe, even for a solid, is about $\frac{1}{15}$ part as great; say 0.00244 in volume, or 0.00081 linear. Therefore for glass even, a contraction of 1 per cent. in diameter would imply a fall of temperature by 1230° C., and a mean specific heat of 218. This seems certainly a minimum value.

"But if we suppose the expansion coefficient to be as large as that of hydrogen, a contraction of 1 per cent. would correspond to a change of temperature by 8.2° C. or a mean specific heat of 32,700, if equivalent to 20,000 years' supply. This is out of the question.

"Now Thomson has computed that bodies smaller than the sun, falling from a state of relative rest at mutual distances which are large in comparison with their diameters, and forming a globe equal to the sun, would generate 20,000 times the present annual supply. This would be greater did we consider the unquestionable increase of the sun's density towards his centre. And since it seems out of the question that resistance and previous minor impacts could have consumed more than one-half the heat, he inferred ten million times a year's supply to be the lowest, and one hundred million times to be the highest, estimate of the sun's initial heat.

"Now we have every reason for the belief that radiation is proportional to temperature. Assuming this and taking the temperature of the sun's photosphere as 14,000° C.,

10,000,000 times the present annual supply would be radiated	in 3,650,000 years if the specific heat were 218,	1000.
100,000,000 times the present annual supply would be radiated	in 7,280,000 " " " " " "	1000.
100,000,000 times the present annual supply would be radiated	in 8,250,000 years if the specific heat were 218,	1000.
500,000,000 times the present annual supply would be radiated	in 25,500,000 " " " " " "	1000.
500,000,000 times the present annual supply would be radiated	in 11,700,000 years if the specific heat were 218,	1000.
	in 38,900,000 " " " " " "	1000.

"For vapours, other than hydrogen, the greatest known specific heat, so far as I am aware, is 0.508 (ammonia); and hydrogen, which has less than 3.5, cannot form any considerable portion of the sun's mass.* A specific heat so high as 1,000 seems altogether out of the question; yet it will be seen that, even on this supposition, an amount of initial heat equal to 500,000,000 the present annual supply, would have been radiated in less than forty million years, were the sun's radiative capacity proportional to his temperature. Taking the more probable age, 10,000,000 years, we should find 226 million times the present annual supply to have been radiated within this period if the specific heat were not greater than 218; and even were the specific heat 1,000, the total radiation would have been eighteen million times a year's radiation at present.

* It seems to form certainly not more than the 18,000th part of the mass of the earth.